AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

Claim 1. (Original) A synthetic nucleic acid molecule comprising a sequence of nucleotides that encodes a human HER2/neu protein as set forth in SEQ ID NO:2, the synthetic nucleic acid molecule being codon-optimized for high level expression in a human cell.

Claim 2. (Original) The synthetic nucleic acid molecule of claim 1 wherein the sequence of nucleotides comprises the sequence of nucleotides set forth in SEQ ID NO:1.

Claim 3. (Original) A vector comprising the nucleic acid molecule of claim 1.

Claim 4. (Original) A host cell comprising the vector of claim 3.

Claim 5. (Original) A synthetic nucleic acid molecule comprising a sequence of nucleotides that encodes a variant human HER2/neu polypeptide that has at least 90% identity to the amino acid sequence of SEQ ID NO:2, which may include up to N_a amino acid alterations over the entire length of SEQ ID NO:2, wherein N_a is the maximum number of amino acid alterations, and is calculated by the formula

$$N_a = X_a - (X_a Y),$$

in which X_a is the total number of amino acids in SEQ ID NO:2, and Y has a value of 0.90, wherein any non-integer product of X_a and Y is rounded to the nearest integer prior to subtracting such product from X_a., wherein the sequence of nucleotides is codon-optimized for high level expression in a human cell.

Claim 6. (Original) A synthetic nucleic acid molecule comprising a sequence of nucleotides that encodes a human HER2ECDTM protein as set forth in SEQ ID NO:14, the synthetic nucleic acid molecule being codon-optimized for high level expression in a human cell.

Claim 7. (Original) The synthetic nucleic acid molecule of claim 6 wherein the sequence of nucleotides comprises the sequence of nucleotides set forth in SEQ ID NO:9.

Claim 8. (Original) A vector comprising the nucleic acid molecule of claim 6.

Claim 9. (Original) A host cell comprising the vector of claim 8.

Claim 10. (Original) A synthetic nucleic acid molecule comprising a sequence of nucleotides that encodes a variant human HER2ECDTM polypeptide that has at least 90% identity to the amino acid sequence of SEQ ID NO:14, which may include up to N_a amino acid alterations over the entire length of SEQ ID NO:14, wherein N_a is the maximum number of amino acid alterations, and is calculated by the formula

$$N_a = X_a - (X_a Y),$$

in which X_a is the total number of amino acids in SEQ ID NO:14, and Y has a value of 0.90, wherein any non-integer product of X_a and Y is rounded to the nearest integer prior to subtracting such product from X_a., wherein the sequence of nucleotides is codon-optimized for high level expression in a human cell.

Claim 11. (Original) A process for expressing a human HER2/neu protein in a recombinant host cell, comprising:

(a) introducing a vector comprising the nucleic acid of claim 1 into a suitable host cell; and,

(b) culturing the host cell under conditions which allow expression of said human HER2 protein.

Claim 12. (Original) A process for expressing a human HER2ECDTM protein in a recombinant host cell, comprising:

(a) introducing a vector comprising the nucleic acid of claim 6 into a suitable host cell; and,

(b) culturing the host cell under conditions which allow expression of said human HER2ECDTM protein.

Claim 13. (Currently Amended) A method of preventing or treating HER2-associated cancer comprising administering to a ~~mammal~~ human a vaccine vector comprising a synthetic codon-optimized nucleic acid molecule, the nucleic acid molecule comprising a sequence of nucleotides that encodes a human HER2/neu protein as set forth in SEQ ID NO:2 or a human HER2ECDTM protein as set forth in SEQ ID NO:14.

Claim 14. (Canceled)

Claim 15. (Currently Amended) A method according to claim ~~14~~ 13 wherein the vector is an adenovirus vector or a plasmid vector.

Claim 16. (Original) A method according to claim 15 wherein the vector is an adenoviral vector comprising an adenoviral genome with a deletion in the adenovirus E1 region, and an insert in the adenovirus E1 region, wherein the insert comprises an expression cassette comprising:

(a) a codon-optimized polynucleotide encoding a human HER2 protein or a human HER2ECDTM protein; and

(b) a promoter operably linked to the polynucleotide.

Claim 17. (Original) A method according to claim 15 wherein the vector is a plasmid vaccine vector, which comprises a plasmid portion and an expressible cassette comprising:

(a) a codon-optimized polynucleotide encoding a human HER2 protein or a human HER2ECDTM protein; and

(b) a promoter operably linked to the polynucleotide.

Claim 18. (Original) An adenovirus vaccine vector comprising an adenoviral genome with a deletion in the E1 region, and an insert in the E1 region, wherein the insert comprises an expression cassette comprising:

(a) a codon-optimized polynucleotide encoding a human HER2 protein or encoding a human HER2ECDTM protein; and

(b) a promoter operably linked to the polynucleotide.

Claim 19. (Original) An adenovirus vector according to claim 18 which is an Ad 5 vector.

Claim 20. (Original) An adenovirus vector according to claim 18 which is an Ad 6 vector or an Ad 24 vector.

Claim 21. (Original) A vaccine plasmid comprising a plasmid portion and an expression cassette portion, the expression cassette portion comprising:

(a) a codon-optimized polynucleotide encoding a human HER2 protein or a human HER2ECDTM protein; and

(b) a promoter operably linked to the polynucleotide.

Claim 22. (Original) A method of treating a mammal suffering from HER2-associated cancer comprising:

(a) introducing into the mammal a first vector comprising:

i) a codon-optimized polynucleotide encoding a human HER2 protein or a human HER2ECDTM protein; and

ii) a promoter operably linked to the polynucleotide;

(b) allowing a predetermined amount of time to pass; and

(c) introducing into the mammal a second vector comprising:

i) a codon-optimized polynucleotide encoding a human HER2 protein or a human HER2ECDTM protein; and

ii) a promoter operably linked to the polynucleotide.

Claim 23. (Original) A method according to claim 22 wherein the first vector is a plasmid and the second vector is an adenovirus vector.

Claim 24. (Original) A method according to claim 22 wherein the first vector is an adenovirus vector and the second vector is a plasmid.